

Fig. 1a

# Basic LS-APGD Source Operation

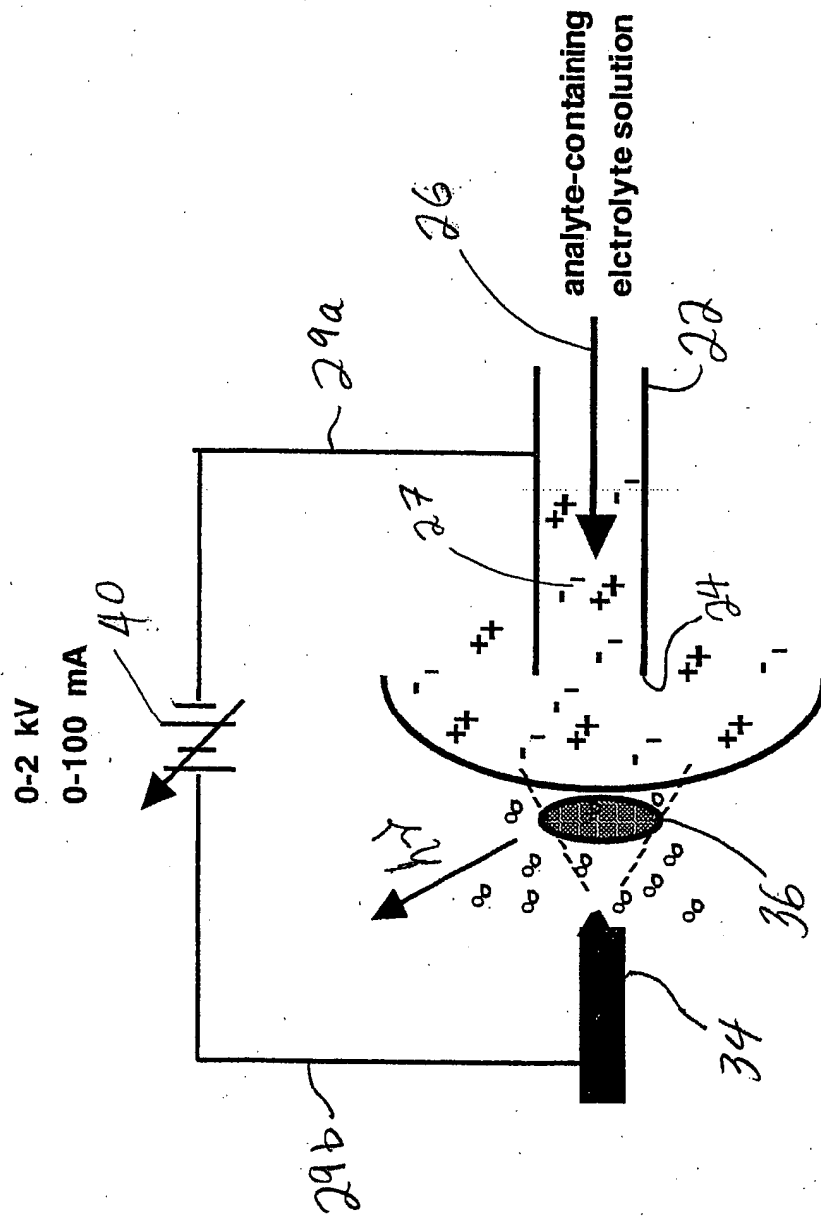


Fig. 1b

# Proposed Implementation of LS-APGD with Microfluidic Devices

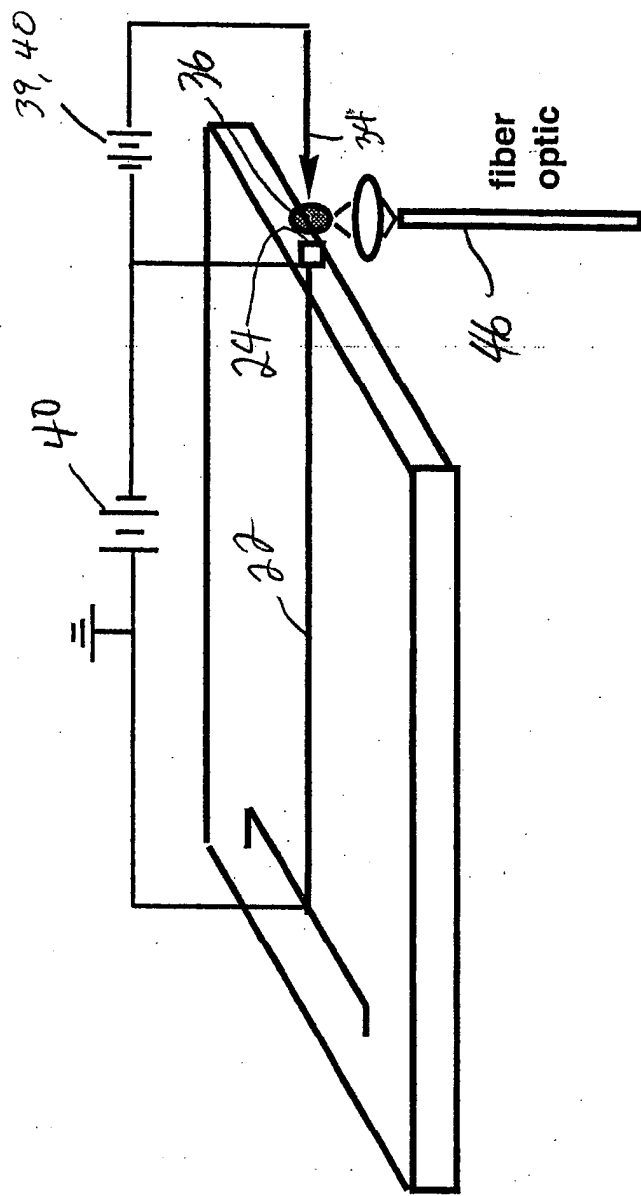


Fig. 1c

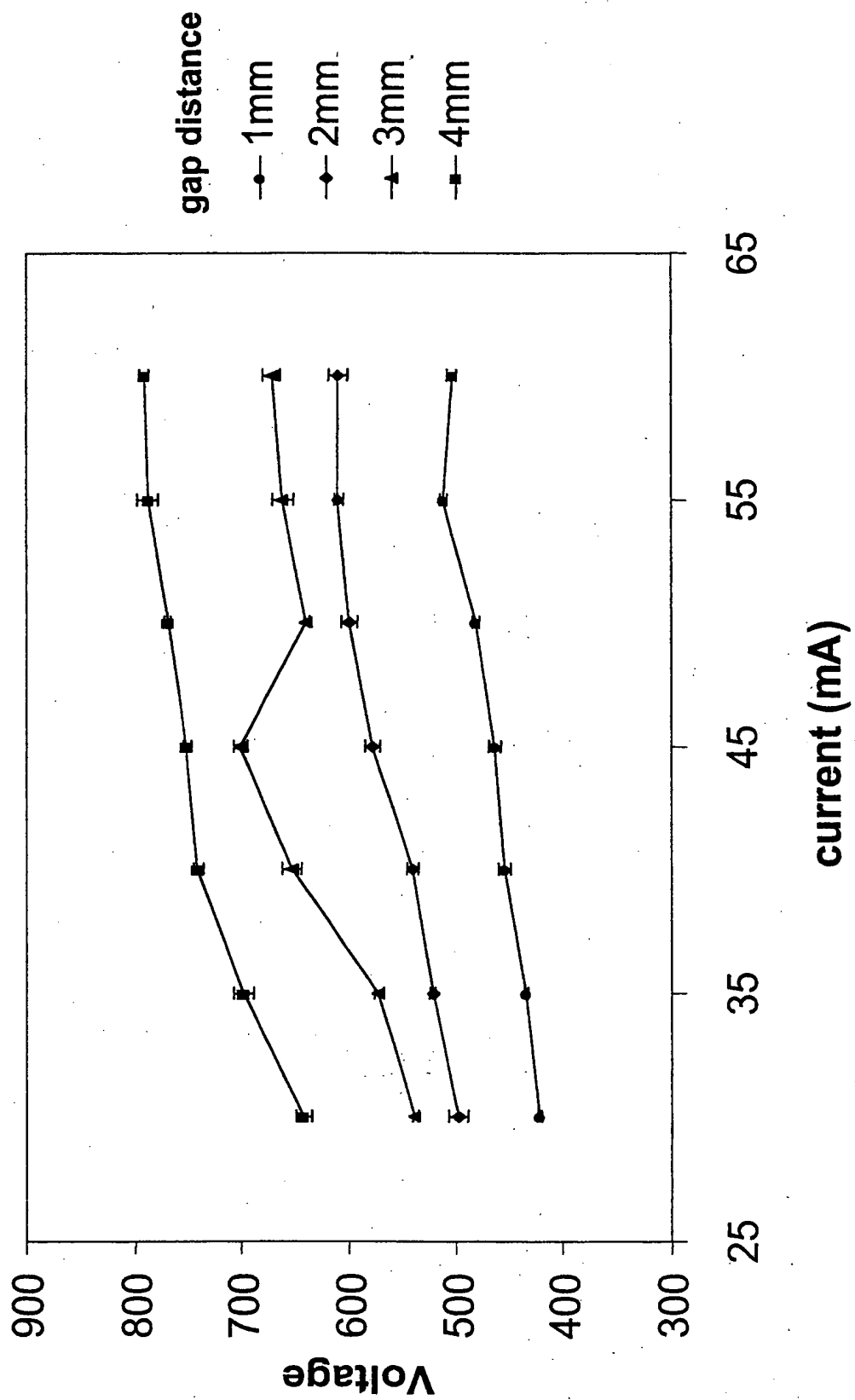


Fig. 2a

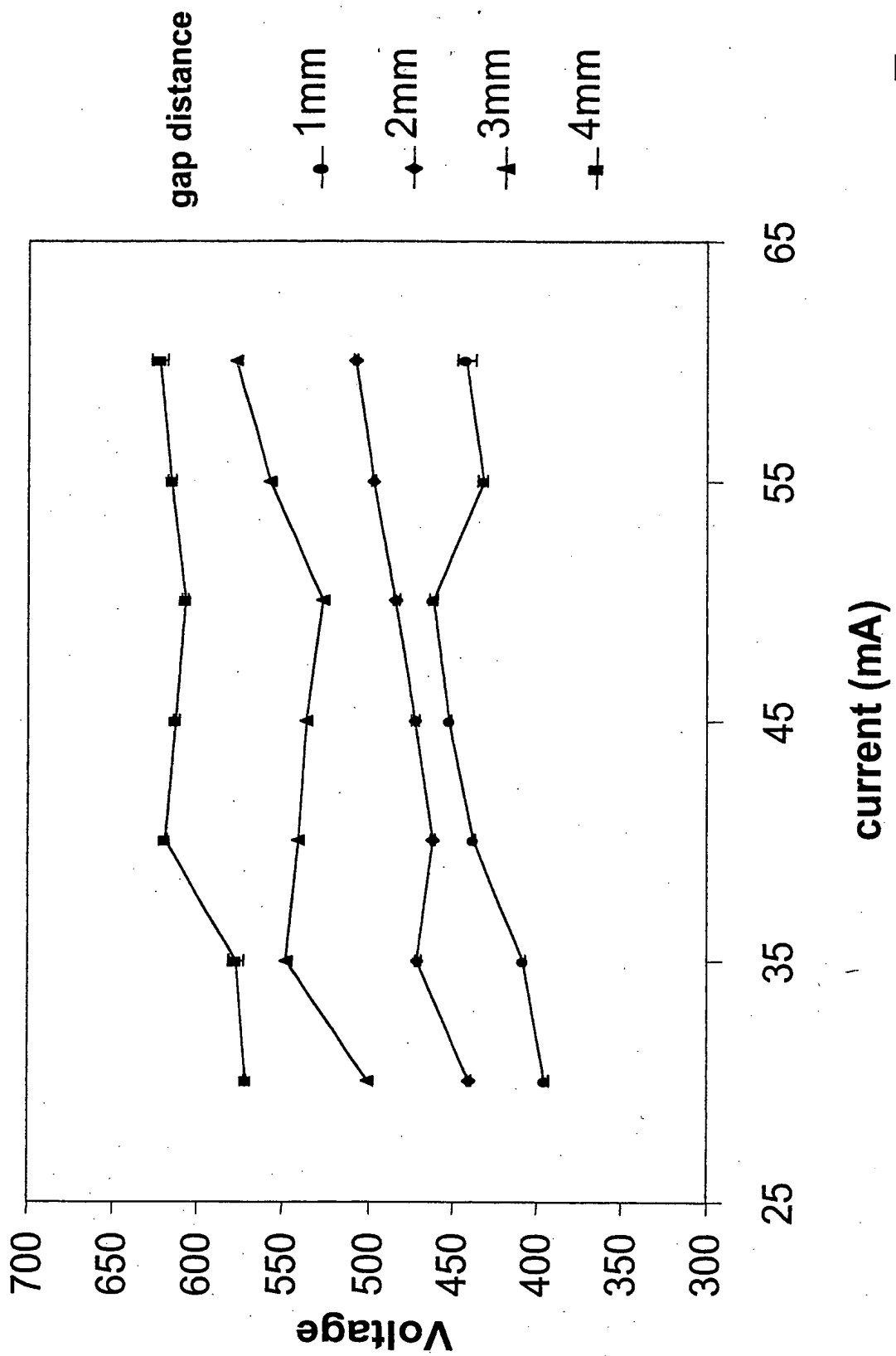


Fig. 2b

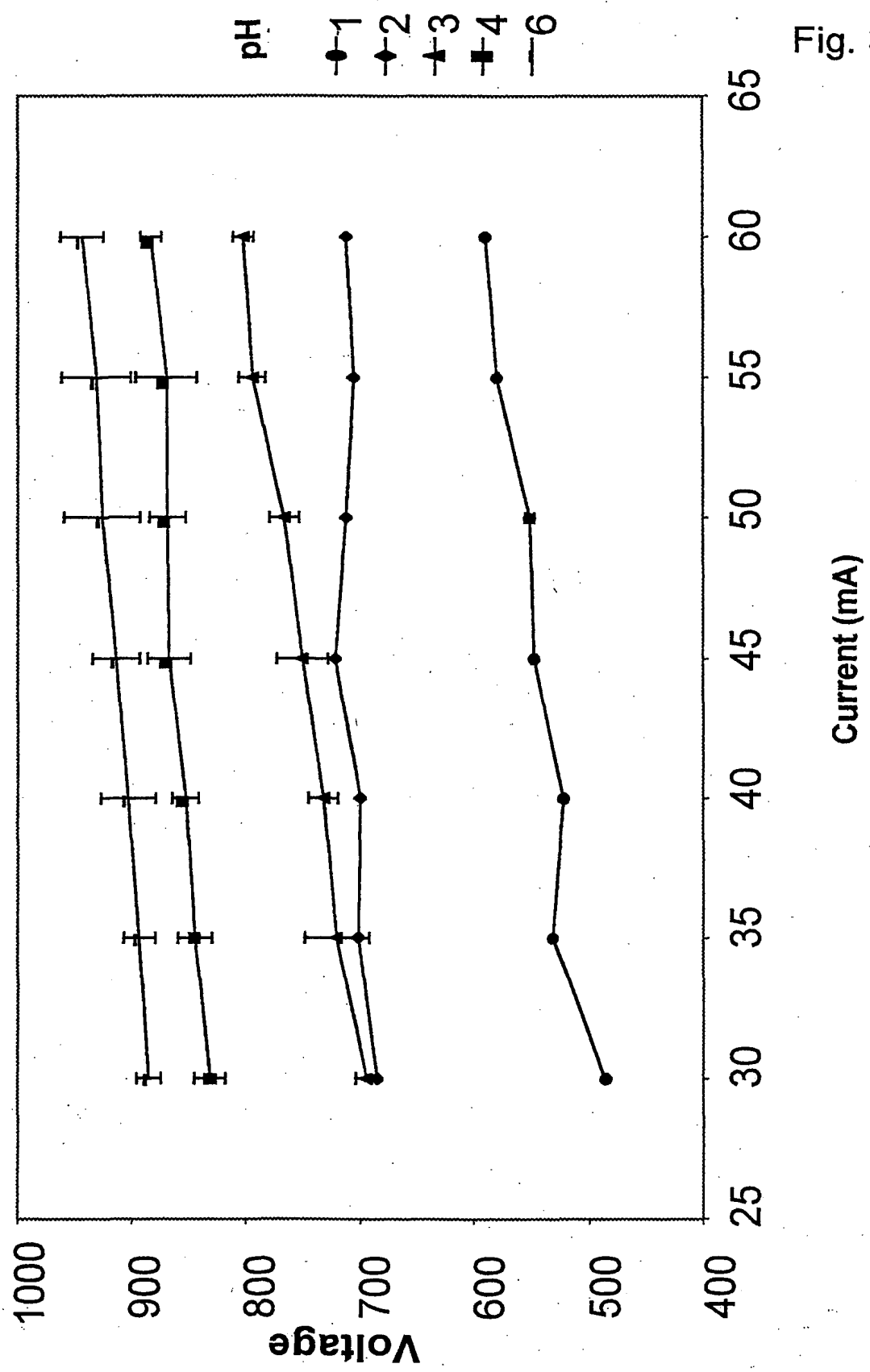


Fig. 3a

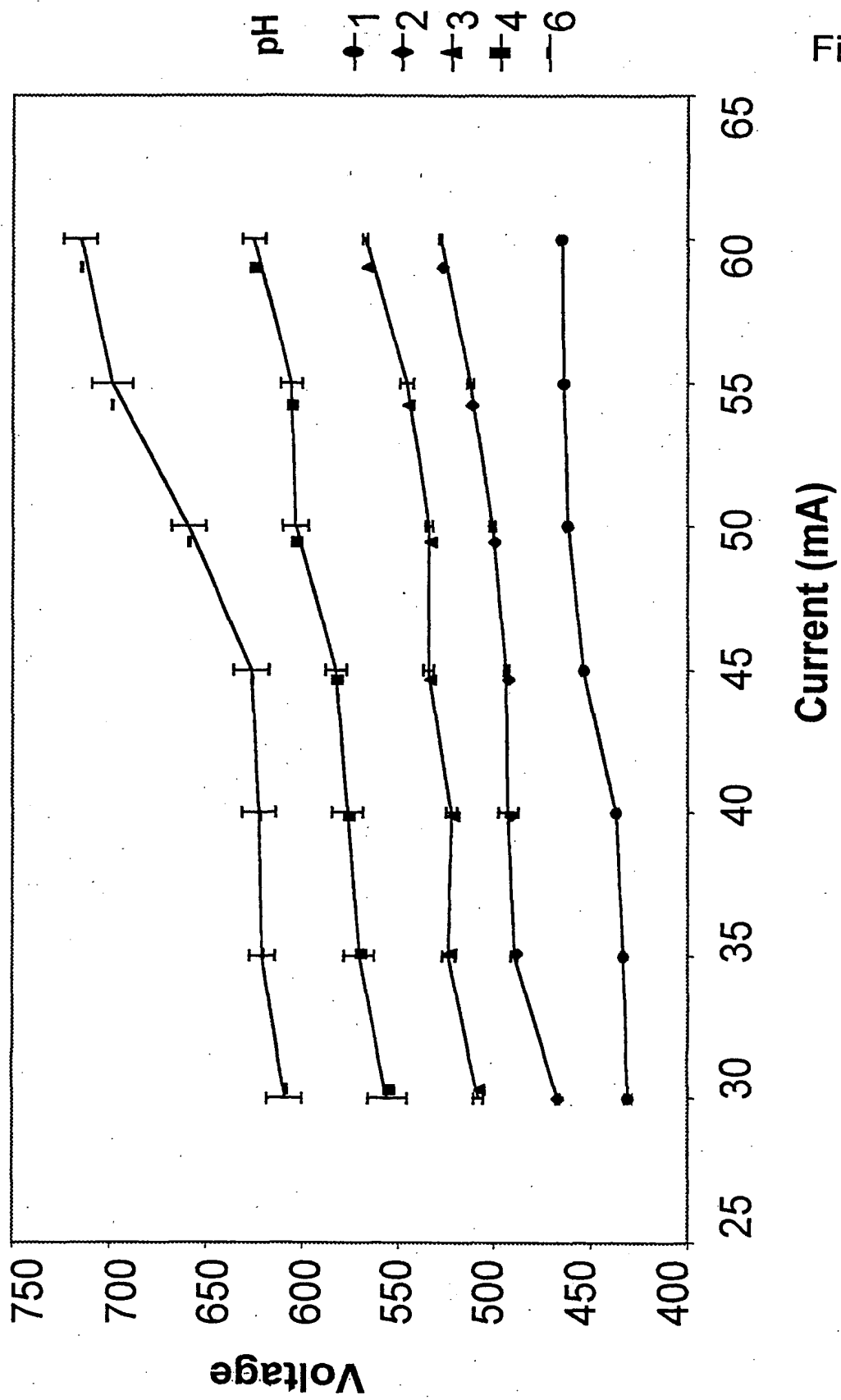


Fig. 3b

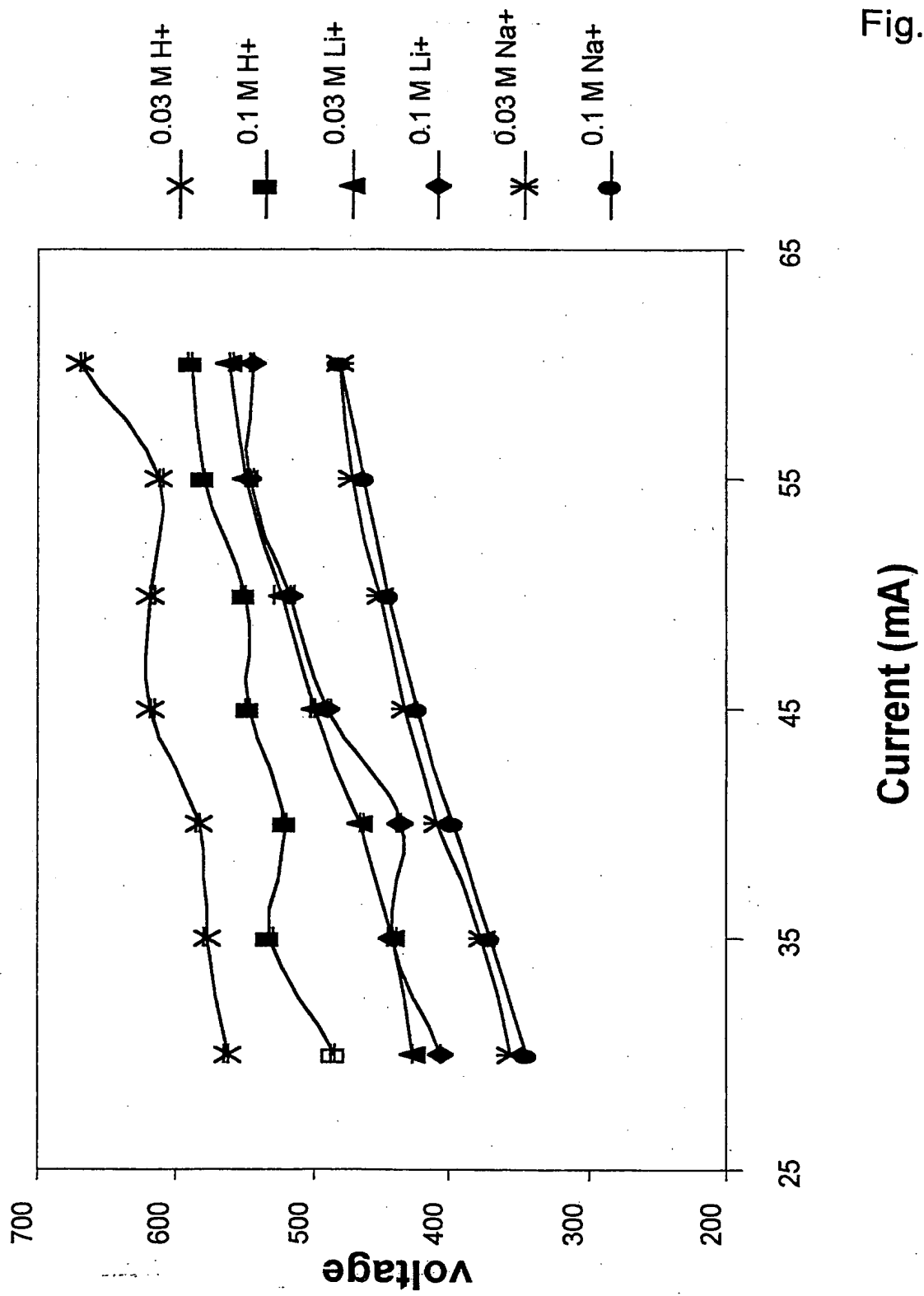


Fig. 4a



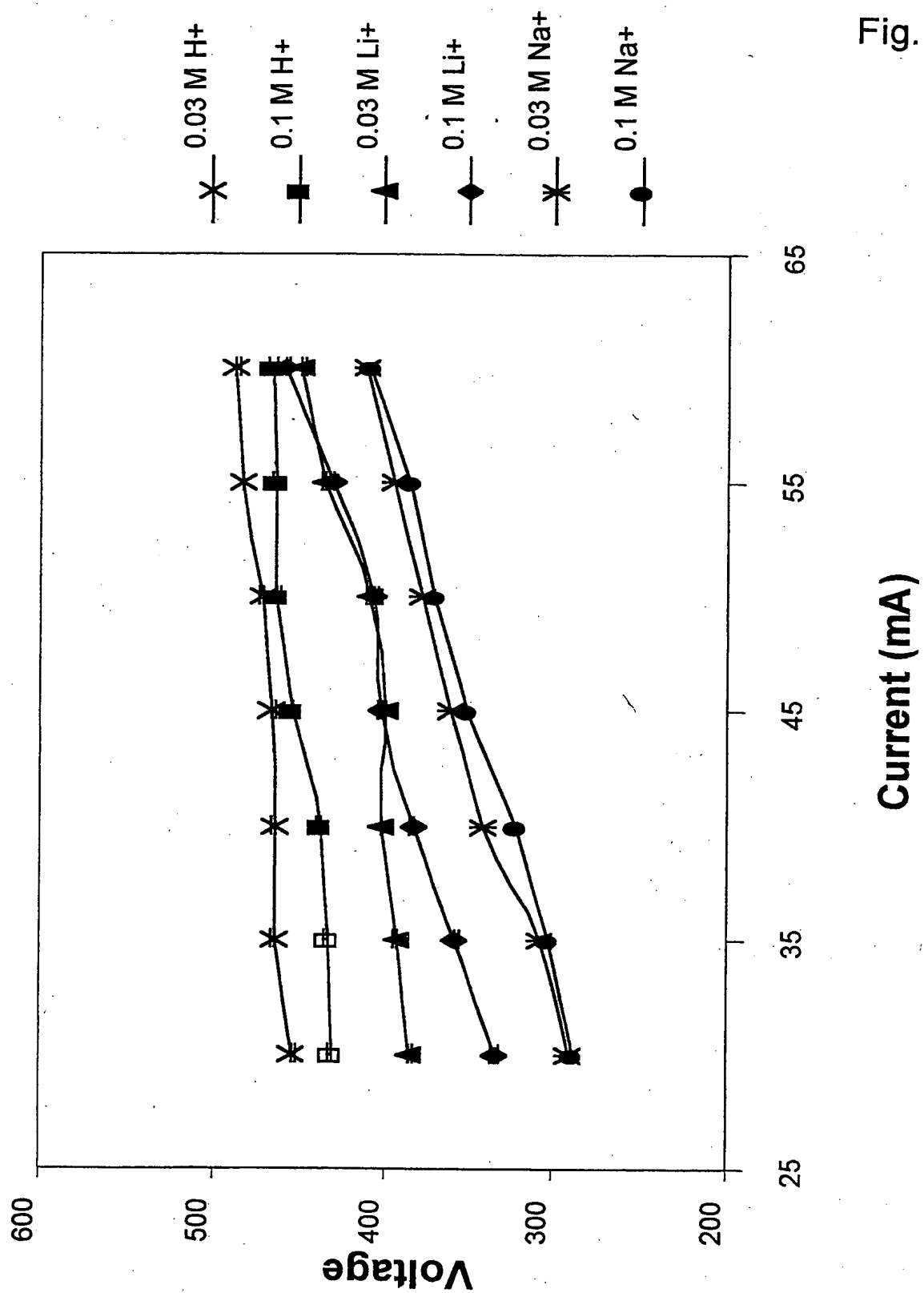


Fig. 4b

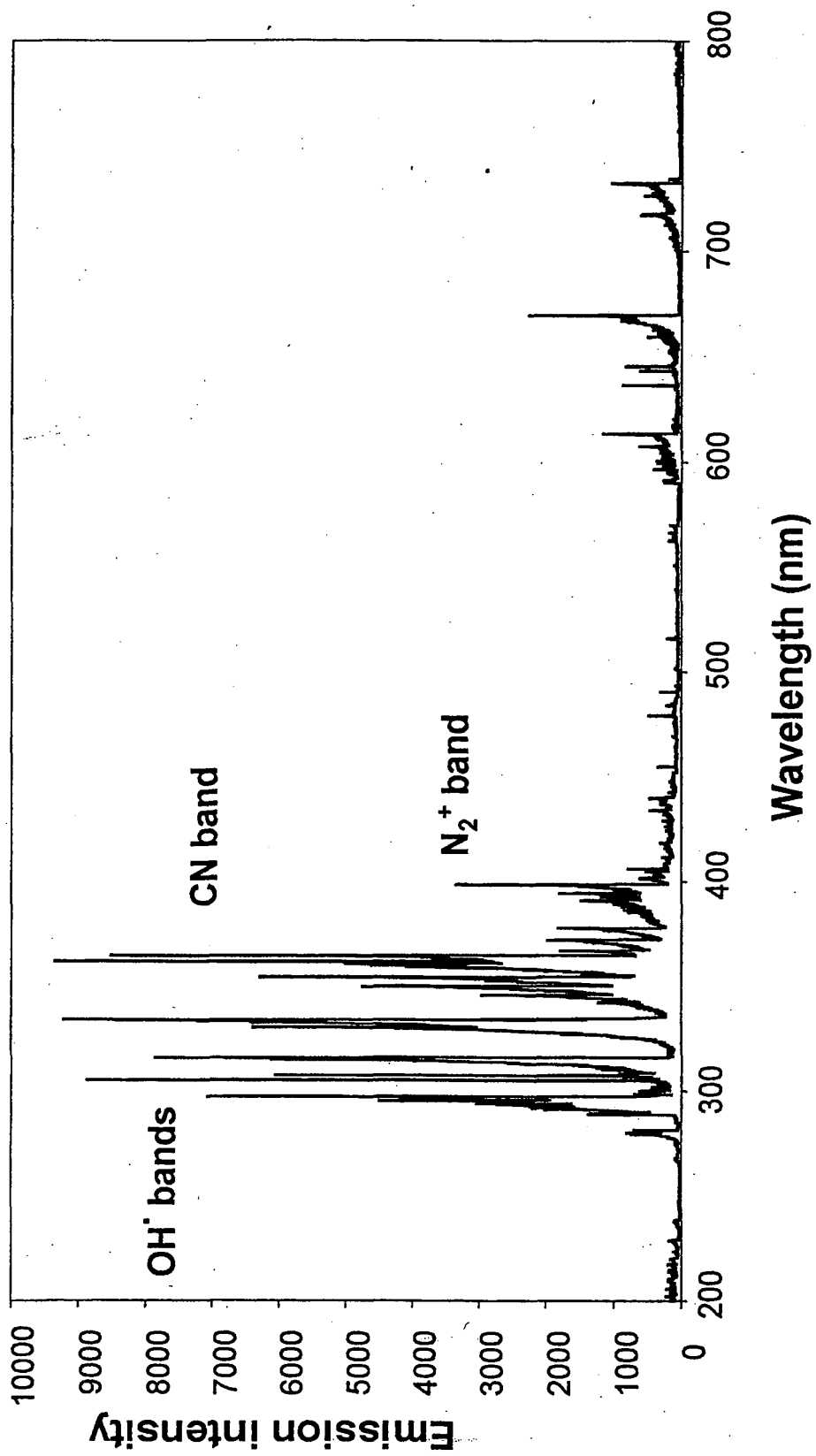


Fig. 5

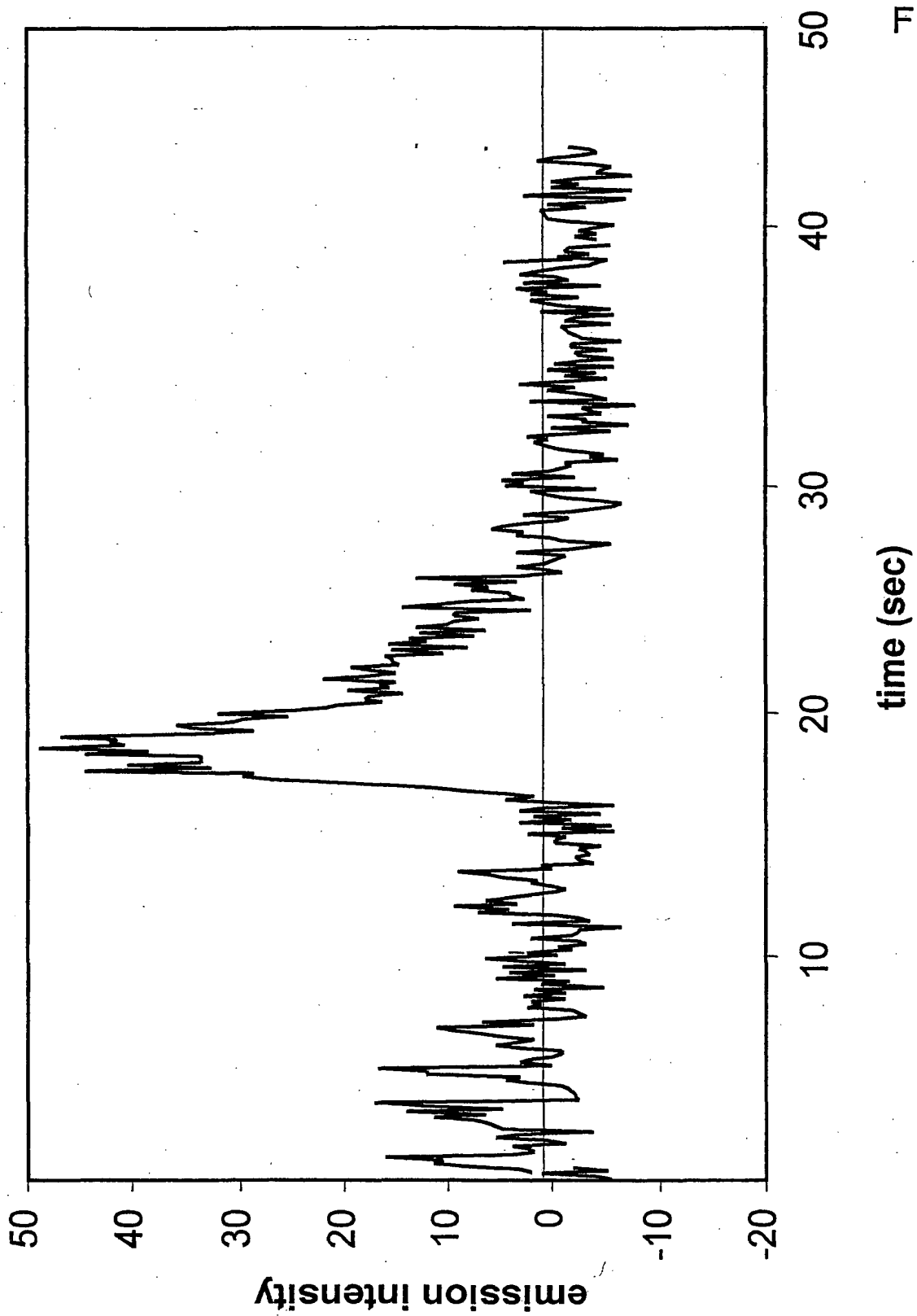
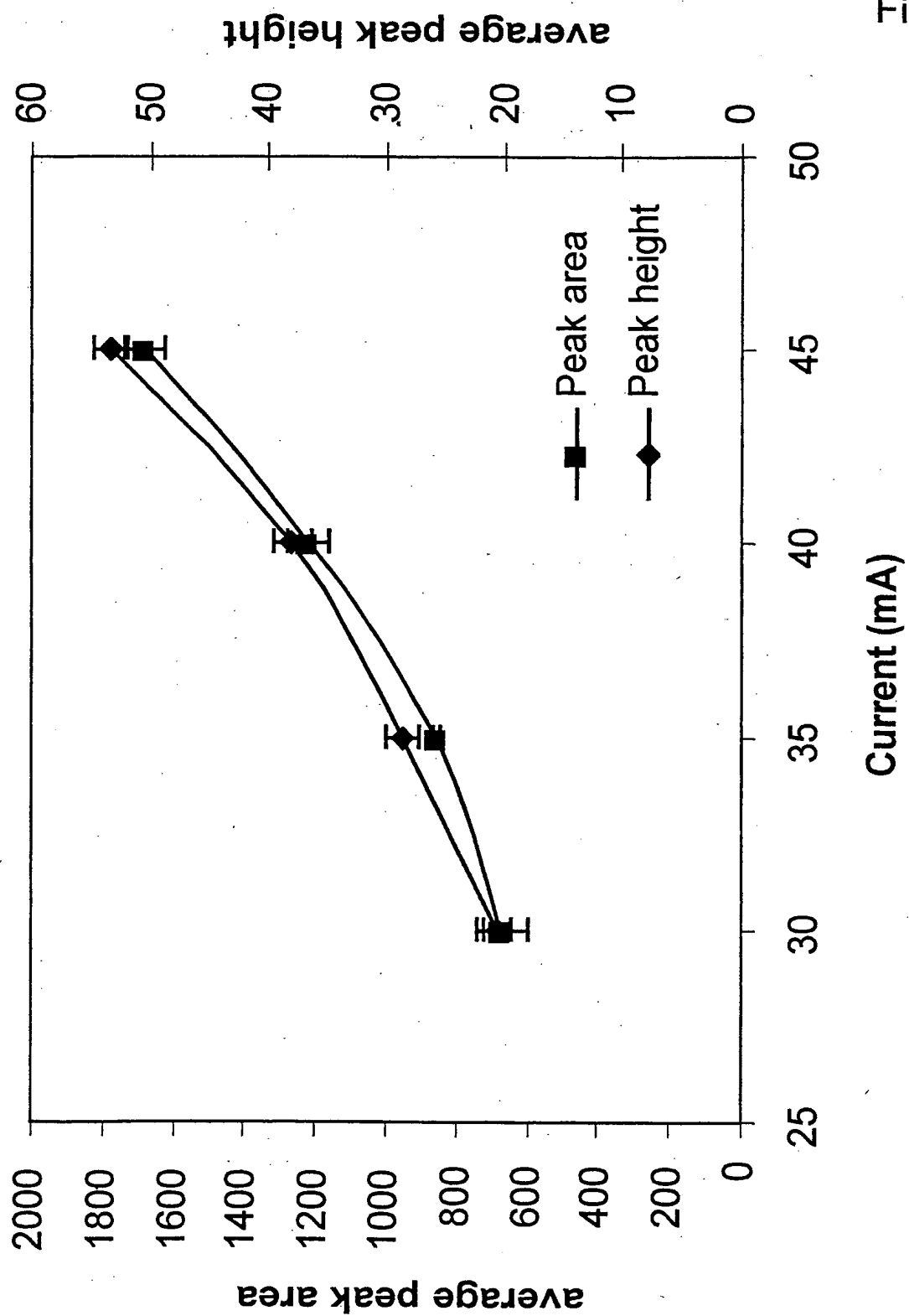


Fig. 6

Fig. 7



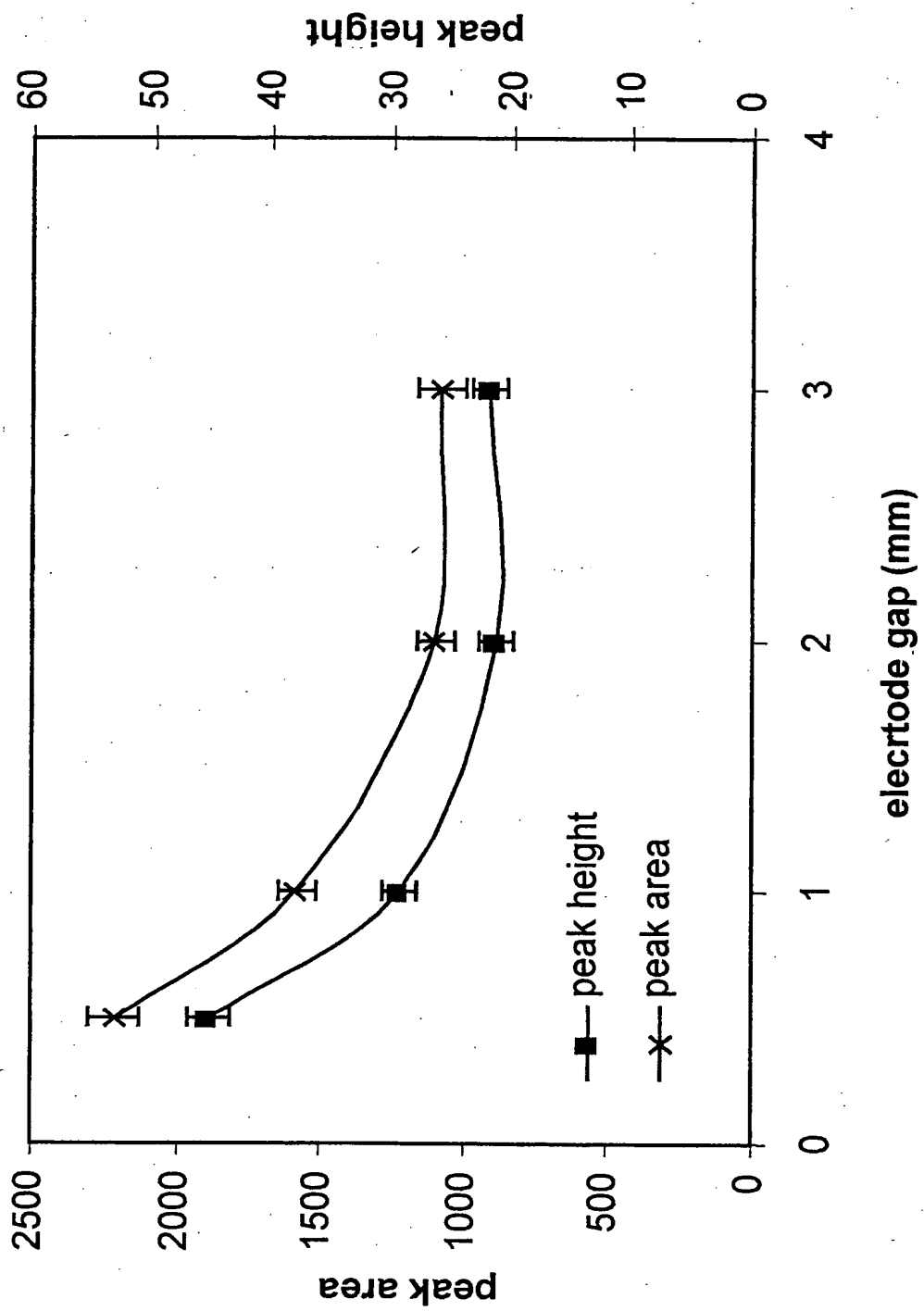


Fig. 8

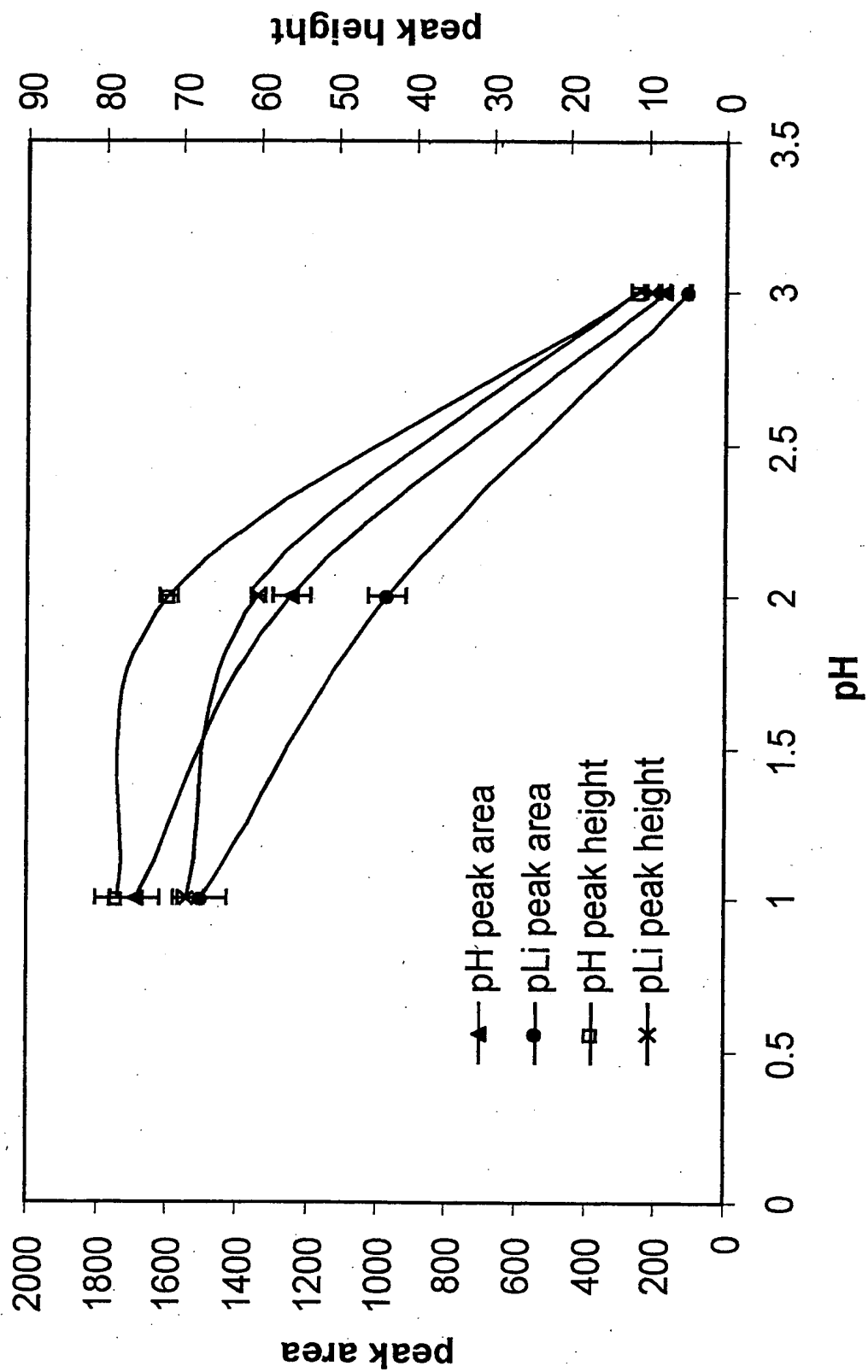


Fig. 9

Analytical response functions and limits of detection for the LS-APGD device. Solution flow rate = 1 mL/min, electrolyte pH = 1, inter-electrode gap = 1 mm, injection volume = 5  $\mu$ L.

| Element | wavelength<br>(nm) | peak height<br>eqn. $R^2$ | peak area<br>eqn. $R^2$   | LOD<br>ppm (ng) |
|---------|--------------------|---------------------------|---------------------------|-----------------|
| Na      | 589.0              | $y=0.421x + 42.8$ 0.9859  | $y=15.81x + 978.6$ 0.9784 | 12 (60)         |
| Fe      | 248.3              | $y=1.06x - 102.1$ 0.9365  | $y=45.80x - 6649$ 0.909   | 12 (60)         |
| Pb      | 405.8              | $y=1.18x - 10.45$ 0.977   | $y=16.16x - 419.7$ 0.9298 | 14 (70)         |

**FIG. 10**

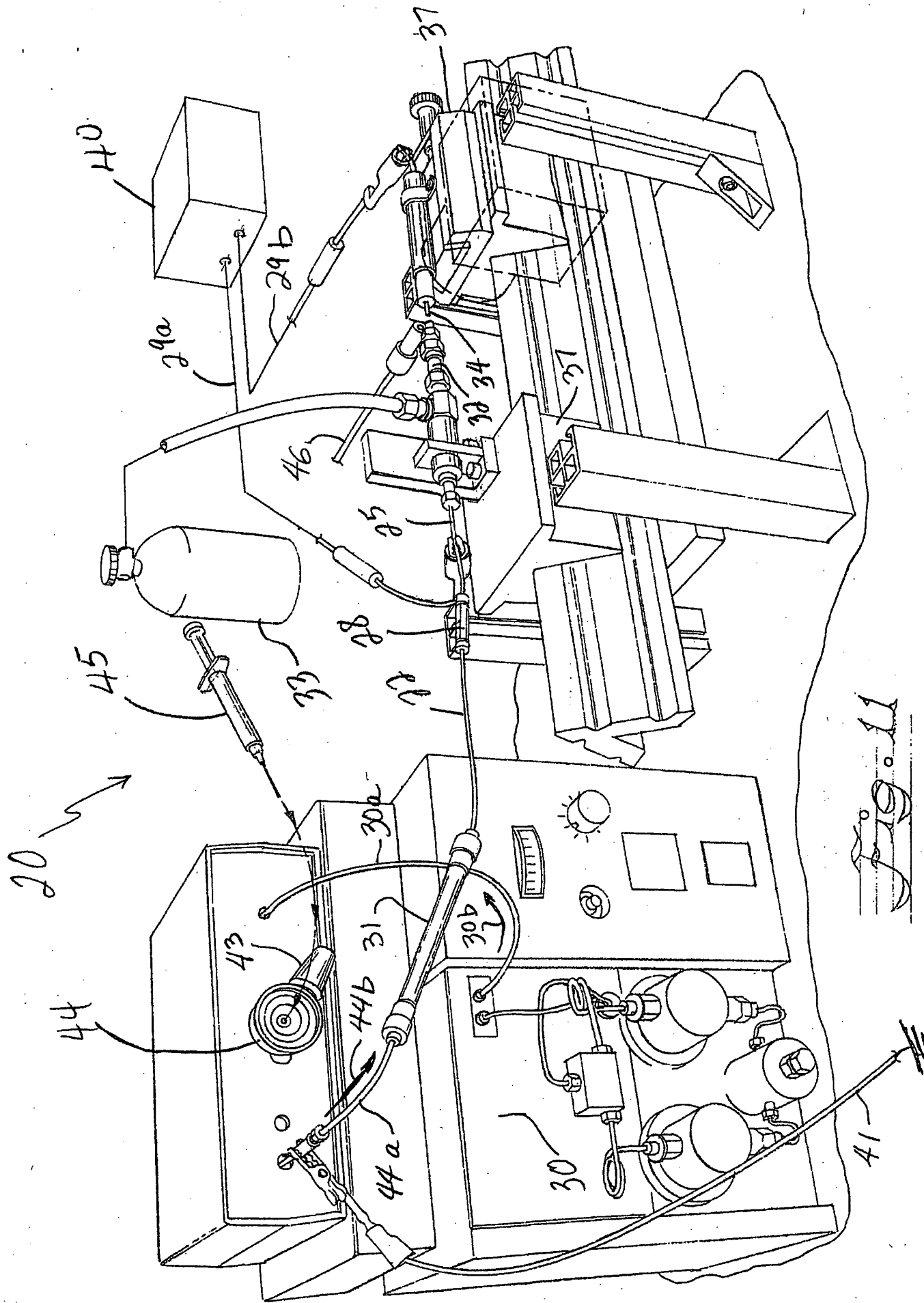


Fig. 11



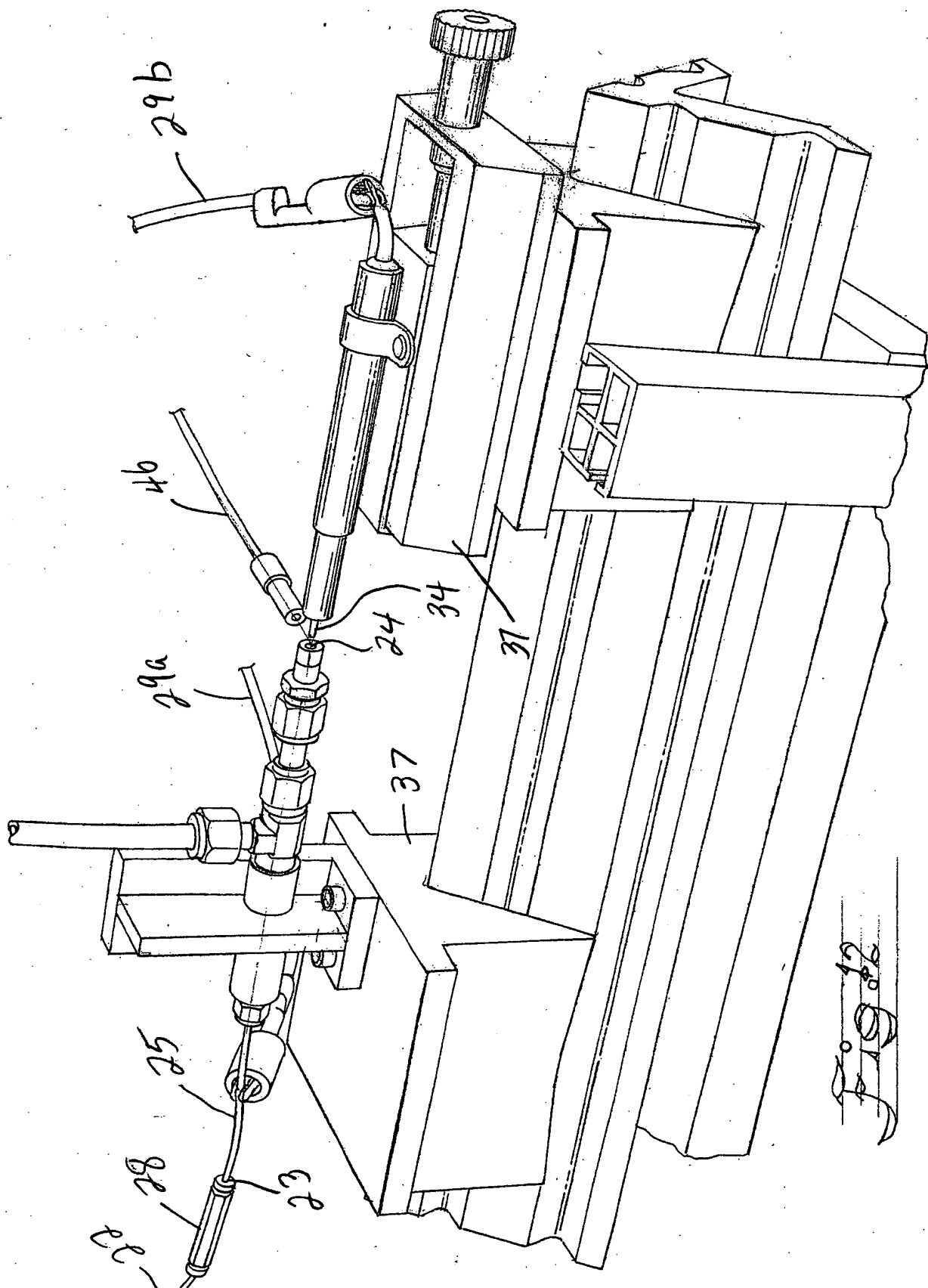


Fig. 12

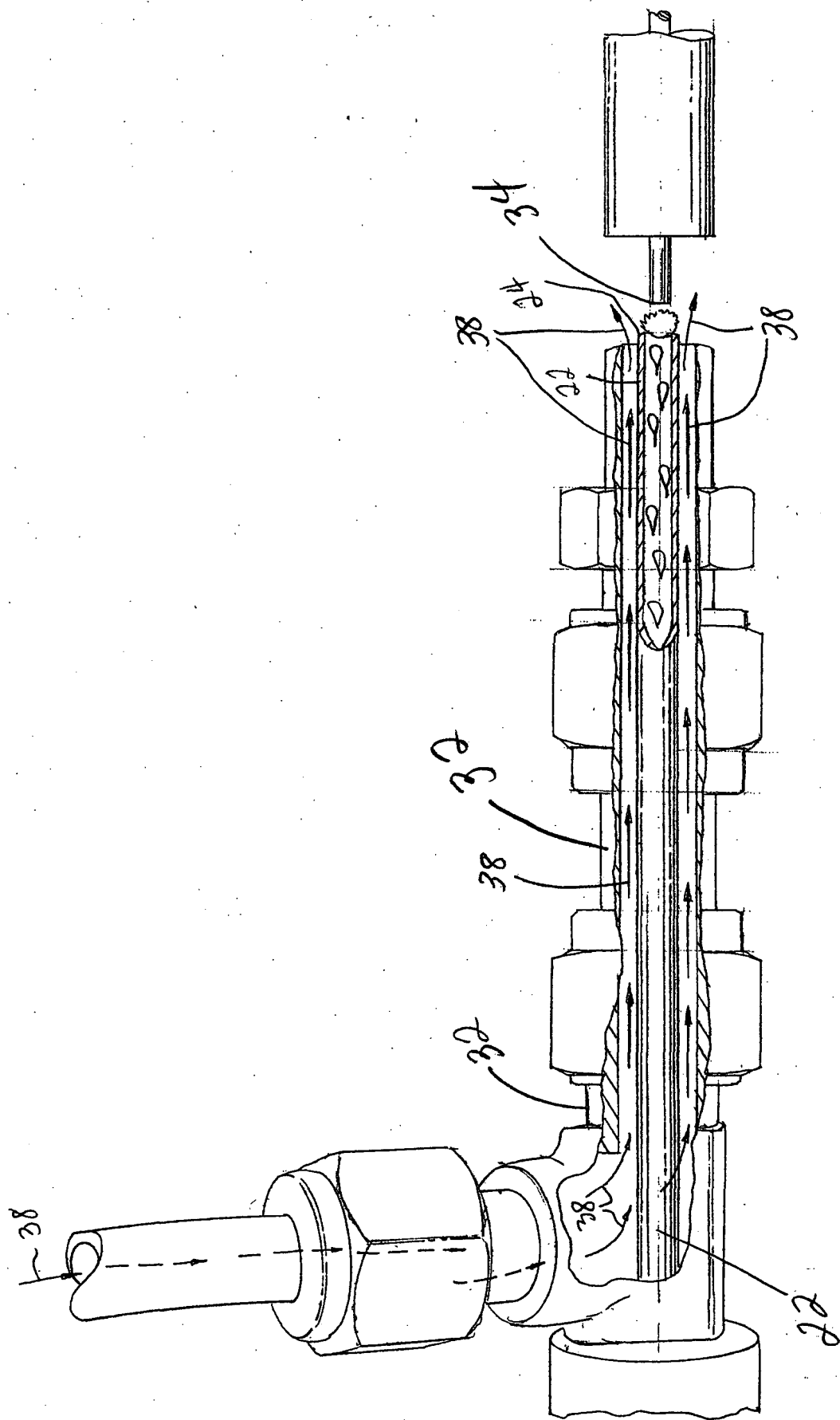
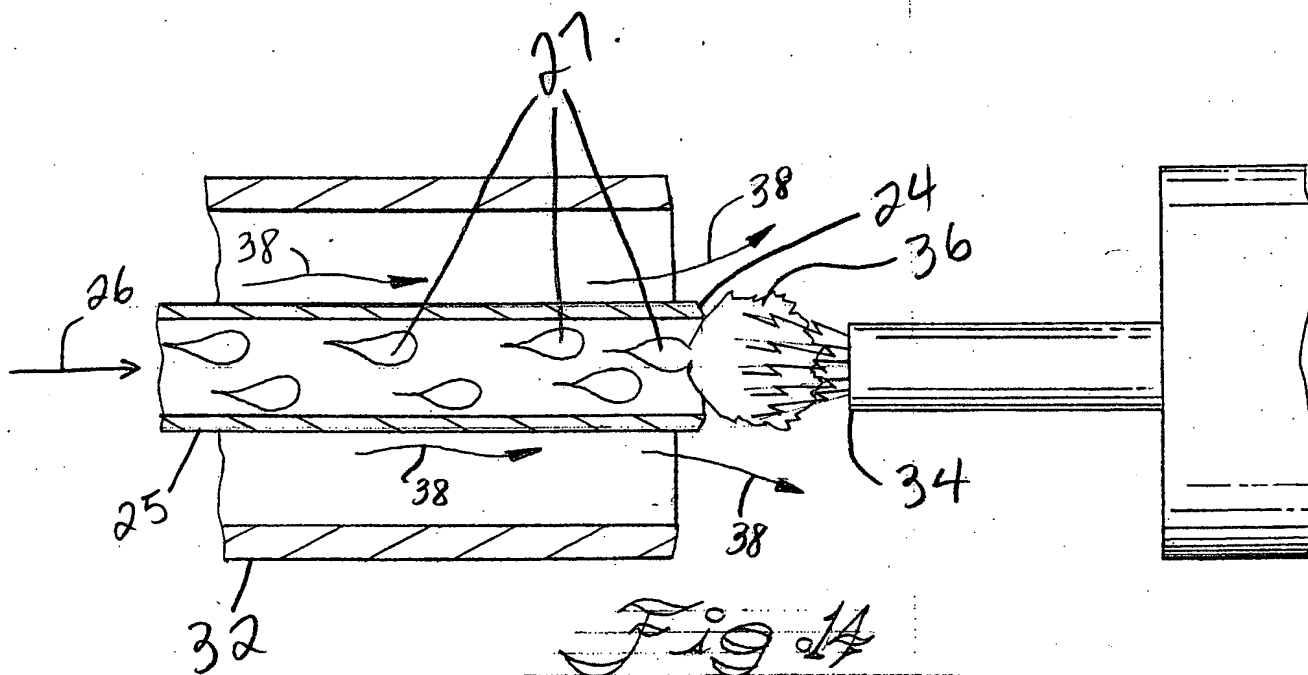


Fig. 13



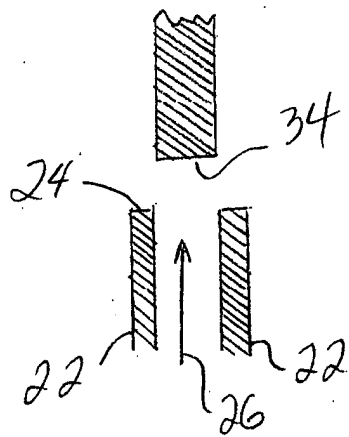


FIG. 15A

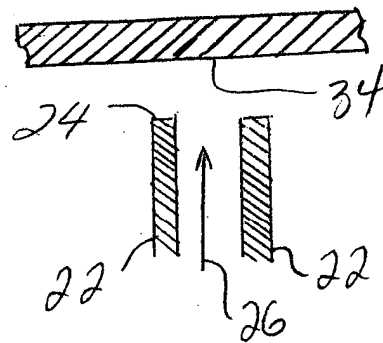


FIG. 15B

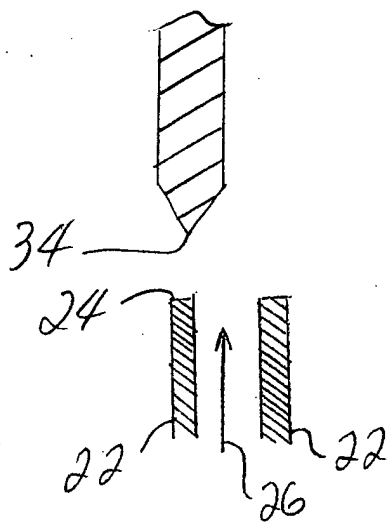


FIG. 15C

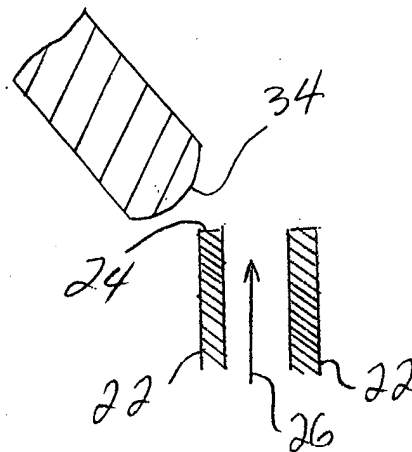


FIG. 15D

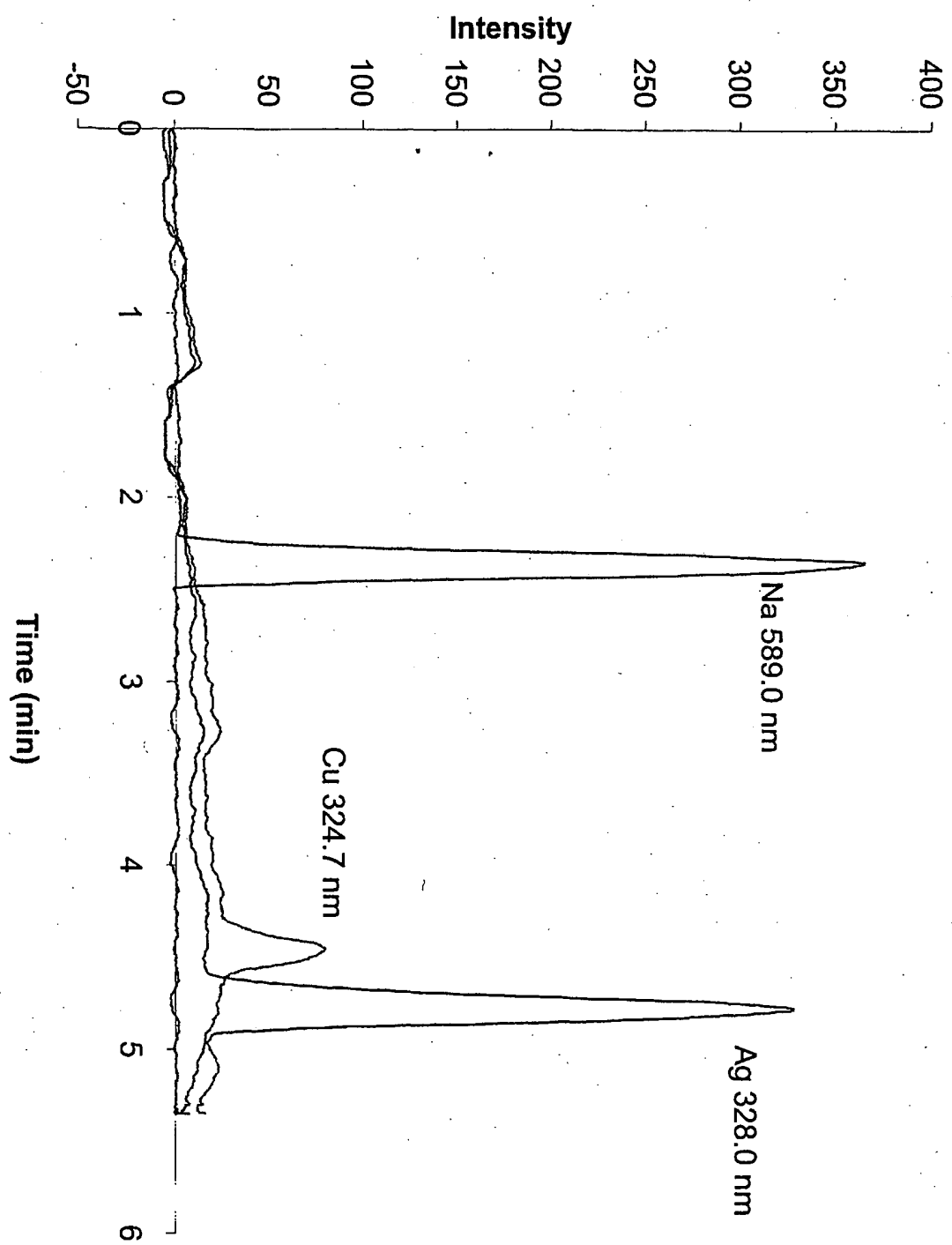


FIG 16